# **Communications** in Computer and Information Science

1181

Commenced Publication in 2007
Founding and Former Series Editors:
Phoebe Chen, Alfredo Cuzzocrea, Xiaoyong Du, Orhun Kara, Ting Liu,
Krishna M. Sivalingam, Dominik Ślęzak, Takashi Washio, Xiaokang Yang,
and Junsong Yuan

#### **Editorial Board Members**

Simone Diniz Junqueira Barbosa

Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Rio de Janeiro, Brazil

Joaquim Filipe

Polytechnic Institute of Setúbal, Setúbal, Portugal

Ashish Ghosh

Indian Statistical Institute, Kolkata, India

Igor Kotenko

St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences, St. Petersburg, Russia

Lizhu Zhou

Tsinghua University, Beijing, China

More information about this series at http://www.springer.com/series/7899

Guangtao Zhai · Jun Zhou · Hua Yang · Ping An · Xiaokang Yang (Eds.)

# Digital TV and Wireless Multimedia Communication

16th International Forum, IFTC 2019 Shanghai, China, September 19–20, 2019 Revised Selected Papers



Editors
Guangtao Zhai
Shanghai Jiao Tong University
Shanghai, China

Hua Yang Shanghai Jiao Tong University Shanghai, China

Xiaokang Yang Shanghai Jiao Tong University Shanghai, China Jun Zhou Shanghai Jiao Tong University Shanghai, China

Ping An Shanghai University Shanghai, China

ISSN 1865-0929 ISSN 1865-0937 (electronic) Communications in Computer and Information Science ISBN 978-981-15-3340-2 ISBN 978-981-15-3341-9 (eBook) https://doi.org/10.1007/978-981-15-3341-9

#### © Springer Nature Singapore Pte Ltd. 2020

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd. The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

#### **Preface**

The present book includes extended and revised versions of papers selected from the 16th International Forum of Digital Media Communication (IFTC 2019), held in Shanghai, China, during September 19–20, 2019.

IFTC is a summit forum in the field of digital media communication. The 2019 forum was co-hosted by SIGA, the China International Industry Fair (CIIF 2019), and Shanghai Association for Science and Technology, and co-sponsored by Shanghai Jiao Tong University (SJTU), China Telecom Group, Shanghai Telecom Company, IEEE BTS Chapter of Shanghai Section, Shanghai University of Engineering Science, and Shanghai Key Laboratory of Digital Media Processing and Transform. The 16th IFTC serves as an international bridge for extensively exchanging the latest research advances of digital media communication around the world as well as the relevant policies of industry authorities. The forum also aims to promote the technology, equipment, and application in the field of digital media by comparing the characteristics, framework, significant techniques and their maturity, analyzing the performance of various applications in terms of scalability, manageability, and portability, and discussing the interfaces among varieties of networks and platforms. Also, a "TianYi" Cup AI competition was held, sponsored by Shanghai Telecom Company.

The conference program included invited talks delivered by 4 distinguished speakers from Macau, China, as well as an oral session of 6 papers and a poster session of 26 papers. Another 3 papers were accepted from the AI competition. The topics of these papers range from audio/image processing to image and video compression as well as telecommunications. This book contains 35 papers selected from IFTC 2019.

The proceeding editors wish to thank the authors for contributing their novel ideas and visions that are recorded in this book, and all reviewers for their contributions. We also thank Springer for their trust and for publishing the proceedings of IFTC 2019.

November 2019

Guangtao Zhai Jun Zhou Hua Yang Ping An Xiaokang Yang

# **Organization**

#### **General Chairs**

Xiaokang Yang Shanghai Jiao Tong University, China

Ping An Shanghai University, China

Guangtao Zhai Shanghai Jiao Tong University, China

## **Program Committee**

Jun ZhouShanghai Jiao Tong University, ChinaYue LuEast China Normal University, ChinaHua YangShanghai Jiao Tong University, China

Jiantao Zhou University of Macau, China

### **Competition Chairs**

Yiyi Lu China Telecom Shanghai Company, China

Zhijun Fang Shanghai University of Engineering Science, China

Hanlong Guo China Telecom Shanghai Company, China

#### International Liaisons

Weisi Lin Nanyang Technological University, Singapore

Patrick Le Callet Nantes University, France Lu Zhang INSA de Rennes, France

#### **Finance Chairs**

Yi Xu Shanghai Jiao Tong University, China Lianghui Ding Shanghai Jiao Tong University, China

#### **Publications Chairs**

Xianming Liu Harbin Institute of Technology, China

Qiudong Sun Shanghai Second Polytechnic University, China

Liquan Shen Shanghai University, China

#### **Award Chairs**

Changwen Chen SUNY Buffalo, USA

Wenjun Zhang Shanghai Jiao Tong University, China

# **Publicity Chairs**

Xiangyang Xue Fudan University, China

Yuming Fang Jiangxi University of Finance and Economics, China

# **Industrial Program Chairs**

Zhenning Zhang Think Force Inc., China Guozhong Wang Shanghai University, China

# **Organizing Committee**

Cheng Zhi SIGA, China

(Secretary-General)

# **Contents**

Ima	σe	<b>Processing</b>	
ша	ge	1 locessing	

Fast Traffic Sign Detection Using Color-Specific Quaternion  Gabor Filters	3
Smoke Detection Based on Image Analysis Technology	13
Non-local Recoloring Algorithm for Color Vision Deficiencies with Naturalness and Detail Preserving	23
Missing Elements Recovery Using Low-Rank Tensor Completion and Total Variation Minimization	35
Hyperspectral Image Super-Resolution Using Multi-scale Feature  Pyramid Network  He Sun, Zhiwei Zhong, Deming Zhai, Xianming Liu, and Junjun Jiang	49
Machine Learning	
Unsupervised Representation Learning Based on Generative Adversarial Networks	65
Interactive Face Liveness Detection Based on OpenVINO and Near Infrared Camera	79
Multi-scale Generative Adversarial Learning for Facial Attribute Transfer Yicheng Zhang, Li Song, Rong Xie, and Wenjuan Zhang	91
Convolutional-Block-Attention Dual Path Networks for Slide Transition  Detection in Lecture Videos	103
Attention-Based Top-Down Single-Task Action Recognition in Still Images	115

Adaptive Person-Specific Appearance-Based Gaze Estimation	126
Preliminary Study on Visual Attention Maps of Experts and Nonexperts When Examining Pathological Microscopic Images	140
Few-Shot Learning for Crossing-Sentence Relation Classification	150
Image Classification of Submarine Volcanic Smog Map Based on Convolution Neural Network	162
Multi-Scale Depthwise Separable Convolutional Neural Network for Hyperspectral Image Classification	171
Joint SPSL and CCWR for Chinese Short Text Entity Recognition and Linking	186
A Reading Assistant System for Blind People Based on Hand Gesture Recognition	200
Intrusion Detection Based on Fusing Deep Neural Networks and Transfer Learning	212
The Competition of Garbage Classification Visual Recognition Yiyi Lu, Hanlong Guo, Jiaming Ma, and Zhengrong Ge	224
An Academic Achievement Prediction Model Enhanced by Stacking Network	235
Quality Assessment	
Blind Panoramic Image Quality Assessment Based on Project-Weighted Local Binary Pattern	249
Blind 3D Image Quality Assessment Based on Multi-scale	
Feature Learning	259

Research on Influence of Content Diversity on Full-Reference Image Quality Assessment	268
Huiqing Zhang, Shuo Li, Zhifang Xia, Weiling Chen, and Lijuan Tang	200
Screen Content Picture Quality Evaluation by Colorful Sparse Reference Information	280
PMIQD 2019: A Pathological Microscopic Image Quality Database with Nonexpert and Expert Scores	293
Telecommunication	
A Generalized Cellular Automata Approach to Modelling Contagion and Monitoring for Emergent Events in Sensor Networks	305
Video Surveillance	
Large-Scale Video-Based Person Re-identification via Non-local Attention and Feature Erasing	327
Design and Optimization of Crowd Behavior Analysis System Based on B/S Software Architecture	340
Affective Video Content Analysis Based on Two Compact Audio-Visual Features	355
Virtual Reality	
Image Aligning and Stitching Based on Multilayer Mesh Deformation Mingfu Xie, Jun Zhou, Xiao Gu, and Hua Yang	367
Point Cloud Classification via the Views Generated from Coded Streaming Data	384
Geometry-Guided View Synthesis with Local Nonuniform Plane-Sweep Volume	393
Single View 3D Reconstruction with Category Information Learning Weihong Cao, Fei Hu, Long Ye, and Qin Zhang	404

# xii Contents

Three-Dimensional Reconstruction of Intravascular Ultrasound Images	
Based on Deep Learning	416
Yankun Cao, Zhi Liu, Xiaoyan Xiao, Yushuo Zheng, Lizhen Cui,	
Yixian Du, and Pengfei Zhang	
Author Index	
Author maex	429